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A VASCULAR FLORA OF THE SAN RAFAEL SWELL, UTAH

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ABSTRACT.—The vegetation of the San Rafael Swell in southeastern Utah is examined based on personal field collections and previously collected herbarium specimens in the Brigham Young University Herbarium (BRY). An annotated checklist includes information on frequency of occurrence and habitat preference for each entity. Treated are 491 vascular plant taxa from 59 families.

The San Rafael Swell is the eroded remnant of a massive domal anticline, oval in shape, stretching along a northeasterly axis from Capitol Reef National Park in northern Wayne County to the foot of the Tavaputs Plateau in Carbon County. Folding of the earth's crust, which formed the domal anticline, and the subsequent erosion of the central dome left a huge area of concentric stone rings, each progressively younger from the innermost to the outermost. One of these rings, the Ferron Sandstone Member of the Mancos Shale Formation, encloses approximately 1.4 million acres of land and forms the boundary of this study. In some cases, where the Ferron Sandstone has been completely eroded from the structural confines of the swell, artificial boundaries have been followed (Fig. 1).

Throughout the field seasons of 1979 and 1980, I attempted to collect representatives of all vascular plant species growing in the San Rafael Swell. A voucher specimen from each collection has been placed in the Brigham Young University Herbarium (BRY). Included in the checklist are species not found by me, but collected by others and vouched for by specimens in the Brigham Young University Herbarium. The checklist is not definitive; additional taxa will undoubtedly be discovered in the swell.

The following sources were used for identification and nomenclature: lower vascular plants and gymnosperms, Cronquist et al. (1972); dicotyledons, Neese and Welsh (1981), Welsh (1978, 1980a, 1980b), Welsh and Atwood (1981), Welsh and Moore (1973), Welsh and Reveal (1977), Welsh et al. (1981); monocotyledons, Cronquist et al. (1977).

The checklist includes 478 vascular plant taxa found in the study area and an additional 13 taxa known to occur on lands immediately adjacent to the study area and to be expected in the San Rafael Swell. These 13 taxa are listed below:

- Allionia incarnata L.
- Cordylanthus wrightii Gray
- Descurainia pinnata (Walter) Brit. var. filipes (Gray) Peck
- Eriogonum smithii Reveal
- Euphorbia micromera Boiss.
- Haplopappus drummondii (T. & G.) Blake
- Helianthus petiolaris Nutt.
- Hymenopappus filifolius Hook. var. lugens (Greene) Jeps.
- Lupinus pusillus Pursh var. rubens (Rydb.) Welsh
- Phacelia demissa Gray var. heterotricha Howell
- Physocarpus alternans (Jones) Howell
- Sphaeralcea munroana (Dougl.) Spach
- Sporobolus giganteus Nash

The flora of the San Rafael Swell is not particularly rich in numbers of species. This is due, at least in part, to the relatively narrow elevational range in the area. Although not rich in numbers of species, the flora is rather rich in numbers of unique and geographically restricted species. The following eight species are strictly endemic to the San Rafael Swell:

- Astragalus rafaelensis Jones
- Cryptantha johnstonii Higgins
- Cryptantha jonesiana (Payson) Payson
- Erigeron maguirei Cronquist

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Fig. 1. Map of the San Rafael Swell study area.

Pediocactus despainii Welsh & Goodrich
Sclerocactus wrightii Benson
Sphaeralcea psoraloides Welsh
Thelypodopsis barnebyi Welsh & Atwood

An additional seven species are endemic to the San Rafael Swell and the adjacent lands in close proximity to the swell. They are listed as follows:

Astragalus pardalinus (Rydb.) Barneby
Astragalus woodruffii Jones
Hoffmanseggia repens (Eastw.) Cockerell
Hymenosyrp depressa (T. & C.) Welsh & Reveal
Lomatium junceum Barneby & Holmgren
Psorothamnus polyadenius (Torr.) Rydb. var. jonesii Barneby
Townsendia aprica Welsh & Reveal

Vegetative Zones

The vegetation of the San Rafael Swell can be divided into five major zones: the Sand Desert Shrub Zone, the Salt Desert Shrub Zone, the Mixed Desert Shrub Zone, the Pinyon-Juniper Zone, and the Ponderosa Pine-Mountain Brush Zone. These zones are controlled principally by elevation, precipitation, and local edaphic factors. Although in some areas the zones are clear and well defined, in most areas they interfuse considerably and it becomes difficult to draw a sharp boundary line between them.
Sand Desert Shrub Zone.—The San Rafael Desert, in the southeastern region of the San Rafael Swell, ranges from an elevation of about 4200 ft (1280 m) at the lowest point to about 5000 ft (1524 m) at the highest point. It is a sandy desert with moving dunes in some areas. Common shrubs in this zone include: Artemisia filifolia, Ephedra torreyana, Yucca harrimaniae, Polomintha incana, Ti- quilia latior, and Coleogyne ramosissima. Abronia elliptica, Oenothera pallida, Hoff- manseggia repens, and Oryzopsis hymenoides are characteristic herbaceous plants of this zone.

Salt Desert Shrub Zone.—In the San Rafael Swell the Salt Desert Shrub Zone is widespread, occurring mainly on alkaline clay soils between 4500 and 5800 ft (1372–1766 m) in elevation. Communities in this zone are characteristically dominated by Atriplex confertifolia interspersed with any of the following subdominant species: Hilaria jamesii, Oryzopsis hymenoides, Enceliopsis nudicaulis, Aristida purpurea, Eriogonum in- flatum, Salsola iberica or Ceratoides lanata.

Highly alkaline flood plains in this zone are often covered by nearly pure stands of Sarcobatus vermiculatus, which may at times be accompanied by thick clumps of Tamarix ramosissima.

Heavy clay soils of the Mancos Shale For- mation are often dominated by Atriplex cu- neata and Atriplex corrugata. During wet springs these areas may be blanketed by annual species such as Cleome lutea, Lapinus pusillus, Malcolmia africana, Camissonia scap- poidea, and Camissonia eastwoodiae.

Mixed Desert Shrub Zone.—Deep, well- drained soils between 4500 and 5800 ft (1372–1766 m) in elevation are often dominated by one or several of the following shrubby species: Artemisia tridentata, Artemisia bigelovii, Artemisia spinescens, Xantho- cephalum sarothrae or Chrysothamnus vis- cidiflorus. These may be intermingled with an understory of herbaceous plants including: Hilaria jamesii, Stipa comata, Bouteloua gracilis, Astragalus spp., Sphaeralcea spp., and Leucenele ericoideae.

Pinyon-Juniper Zone.—Pinus edulis and Juniperus osteosperma are conspicuously dominant at elevations between 5800 and 7800 ft (1766–2377 m). Within this altitudin- al range Juniperus osteosperma is dominant at the lower elevations and Pinus edulis is domi- nant at the higher elevations. Intermediate elevations yield a heterogeneous mixture of both species.

Dense stands have almost no understory, but more open or scattered stands will in- clude almost all the species found in the Mixed Desert Shrub Zone.

Ponderosa Pine-Mountain Brush Zone.—The highest point in the San Rafael Swell is the San Rafael Knob at 7921 ft (2414 m) in elevation. The area surrounding the knob and the summit of Cedar Mountain re- present the highest vegetative zone in the swell. Pinus edulis continues to remain domi- nant even at the highest elevations, but above 7500 ft (2286 m) plants characteristic of the Ponderosa Pine-Mountain Brush Zone be- come increasingly common. Some common species in this zone are: Pinus ponderosa, Ar- temisia nova, Cowania mexicana, Mahonia fremontii, Populus tremuloides, Amelanchier utahensis, Cercocarpus montanus, Ribes lep- tanthum, Juniperus scopulorum, Hymenoxys richardsonii, Symphoricarpos longiflorus and Philadelphus microphyllus.

In addition to these five major vegetative zones, smaller communities dependent on unique local habitats are scattered through- out the area. These include plants distributed along seeps and streams, along washes and roadsides where runoff collects, in hanging gardens, on rocky outcrops, and on disturbed sites.

Annotated Checklist

Following each species entry in the check- list (with the exception of the 13 taxa from lands adjacent to the study area) a designa- tion is given concerning the frequency of oc- currence and habitat preference of the taxon. Plants of broad distribution that are not limited to a specific zone or community type are listed as widespread. The following abbrevia- tions are used:

C—common
O—occasional
U—uncommon
R—rare
SnD—Sand Desert Shrub Zone
SID—Salt Desert Shrub Zone
MD—Mixed Desert Shrub Zone
PJ—Pinyon-Juniper Zone
PM—Ponderosa Pine-Mountain Brush Zone
SS—Seeps and streams
WR—Washes and roadsides
HG—Hanging gardens
RO—Rocky outcrops
DS—Disturbed sites
W—Widespread

ACERACEAE
Acer glabrum Torr. (R;PM)

ANACARDIACEAE
Rhus triloba Nutt. var. simplicifolia (Greene) Barkl. (C;WR)
Rhus triloba Nutt. var. triloba (C;WR)
Toxicodendron rydbergii (Small) Greene (C;SS,HG)

APIACEAE
Cymopteris acaulis (Pursh) Raf. (O;SnD,SID)
Cymopteris bulbosa Nels. (C;W)
Cymopteris fendleri Gray (C;W)
Cymopteris purpurascens (Gray) Jones (O;SID)
Cymopteris purpurea Wats. (O;W)
Lomatium junceum Barneby & Holmgren (R;SID,MD,PJ)

ASYLIDIACEAE
Asclepias cryptoceras Wats. (C;W)
Asclepias labriniformis Jones (C;W,MD,PD)
Asclepias macropetala Eastw. (C;SnD,MD)
Asclepias rutila Maguire & Woodson (O;W)
Asclepias speciosa Torr. (C;WR)

ASTERACEAE
Ambrosia acanthacarpa Hook. (O;SID,MD,PJ)
Ambrosia artimisiifolia L. (C;SID,MD,PJ)
Artemisia biennis Willd. (U;WR)
Artemisia bigelovii Gray (C;MD,PJ)
Artemisia campestris L. (O;SnD,MD)
Artemisia dracunculus L. (C;WR)
Artemisia filifolia Torr. (C;SnD)
Artemisia frigida Willd. (R;WR)
Artemisia ludoviciana Nutt. (O;WR)
Artemisia nova Nels. (C;PJ,PM)
Artemisia pygmaea Gray (O;SID,MD,PJ)
Artemisia spinescens Eaton (O;SID,MD)
Artemisia tridentata Nutt. (C;MD,PJ,WR)
Aster glaucescens Blake (U;PM)
Baccharis emoryi Gray (U;WR)
Brickellia longifolia Wats. (U;WR)
Brickellia microphylla (Nutt.) Gray (U;WR)
Brickellia oblongifolia var. linifolia (Eaton) Robins (O;PJ,WR)
Brickellia scabra (Gray) Nels. (R;HG,WR)

Crescentia steioides Hook. & Arn. (C;SID,MD)
Chamaecrista scoposa (Eastw.) Rydb. (O;PJ)
Chrysothamnus greenei (Gray) Greene (O;SID)
Chrysothamnus linifolius Greene (O;WR)
Chrysothamnus nauseosus (Pall.) Britt. var. consimilis (Greene) Hall (C;WR)
Chrysothamnus nauseosus (Pall.) Britt. var. gnaphaloïdes (Greene) Hall (U;WR)

Cirsium pulchellum (Greene) Woot. & Standl. (U;WR)
Cirsium undulatum (Nutt.) Spreng. (C;WR)
Diceria canescens Gray (U;SnD)
Encelia frutescens Gray (U;WR)
Encelia nudicaulis (Gray) Nels. (C;SID,MD)
Encelia nutans (Eastw.) Nels. (C;SID,MD)
Eriogonum argenteatum Greene (O;SID,MD,PJ)
Eriogonum compactum Blake var. consimilis Cronquist (O;MD,PJ)
Eriogonum divergens T. & G. (U;PJ)
Eriogonum eutyoni Gray (U;PJ,PM)
Eriogonum maguirei Cronquist (R;WR)
Eriogonum pulcherrimus Heller var. pulcherrimus (C;SID,MD,PJ)
Eriogonum pumilus Nutt. ssp. concinnoideus Cronq. var. condensatus (Eaton) Cronq. (C;SID,MD,PJ)
Eriogonum utahensis Gray (C;WR,RO)
Gaillardia pinatifida Torr. (C;SID,MD)
Gaillardia spatulata Gray (C;SID,MD,PJ)
Grindelia squarrosa (Pursh) Dunal. (O;WR)
Haplopappus armerioides (Nutt.) Gray (C;MD,PJ,RO)
Haplopappus drummondii (T. & G. Blake)
Helianthus microcephalus (Gray) Gray (C;PJ,PM)
Helianthus annuus L. (C;WR)
Helianthus anomalus Blake (C;SnD)
Helianthus petiolaris Nutt.

Heterotheca villosa (Pursch) Shinners (C;SID,MD,PJ)
Hymenopappus filifolius Hook. var. lugens (Greene)

Jeps.
Hymenopappus filifolius Hook. var. megacephalus Turner (C;SID,MD)
Hymenopappus filifolius Hook. var. pauciflorus (Johnst.) Turner (O;SID)

Hymenoxys acaulis (Pursh) Parker var. arizonica (Greene) Parker (C;MD,PJ)
Hymenoxys depressa (T. & G.) Welsh & Reveal (O;RO)
Hymenoxys richardsonii (Hook.) Cockerell (C;PJ,PM)
Ica axillaris Pursh (O;SS,WR)
Ica xanthotilina Nutt. (O;WR)

Leuecele ericoides (Torr.) Greene (C;W)
Lygodiaemia arizonica Tomb (C;SID,MD,WR)
Lygodiaemia grandiflora (Nutt.) T. & G. (C;SID)
Lygodiaemia juncea (Pursh) D. Don (R;SnD)
Machaeranthera canescens (Pursh) Gray (R;SnD)
Machaeranthera glandulifolia (Nutt.) Shinners (C;W)
Machaeranthera linearis Greene (U;WR)
Machaeranthera tanacetifolia (H.B.K.) Nees (C;WR)
Malacothrix sonchoides (Nutt.) T. & G. (C;SID,MD)
Oxyprena acerosa Nutt. (C;SS,WR)
Parthenium ligulatum (Jones) Barneby (U;SID,MD,PJ)
Petrorhagia pumila (Nutt.) Greene (C;PJ,WR,RO)
Platyschkuhria integrifolia (Gray) Rydb. var. oblongifolia (Gray) Ellison (C;WR)

Prenanthera exigua (Gray) Rydb. (C;WR,RO)
Seneio multicapitatus Greene (U;PJ,PM,WR)
Senecio multilobatus T. & G. (O;PJ,WR)
Stephanomeria exigua Nutt. (O;WR)
Stephanomeria runcinata Nutt. (R;WR)
Stephanomeria spinosa (Nutt.) Tomb (U;WR)
Stephanomeria tenuifolia (Torr.) Hall (C;WR,RO)
Tanaxacum officinale Weber (C;SS)
Tetradymia canescens DC. (O;PJ,PM)
Tetradymia glabra Gray (C;MD,PJ)
Tetradymia spinosa Hook. & Arn. (O;WR)
Thelesperma subnudum Gray (C;W)
Townsendia annua Beanman (U;MD)
Townsendia aprica Welsh & Reveal (U;SID,MD,PJ)
Townsendia incana Nutt. (C;SID,MD,PJ)
Tragopogon dubius Scop. (C;W)
Vancelea stylosa (Eastw.) Greene (C;SnD)
Wyethia scabra Hook. (C;WR)
Xanthium strumarium L. (O;SS)
Xanthocephalus microcephalus (DC.) Shinners (R;PJ)
Xanthocephalus sarothae (Pursh) Shinners (C;SID,MD,PJ)
Xylorhiza venusta (Jones) Heller (C;RO)

BERBERIDACEAE
Mahonia fremontii (Torr.) Fedde (C;MD,PJ)

BETULACEAE
Betula occidentalis Hook. (R;SS)

BORAGINACEAE
Cryptantha cinerea Greene (R;PJ,PM)
Cryptantha confertifolia (Greene) Payson (R;SnD)
Cryptantha crassisepala (T. & G.) Greene var. elachantha Johnst. (C;W)
Cryptantha flavescens (Nels.) Payson (C;W)
Cryptantha flavoculata (Nels.) Payson (C;PJ)
Cryptantha fulvocanescens (Wats.) Payson var. echnoides (Jones) Higgins (O;SID)
Cryptantha fulvocanescens (Wats.) Payson var. fulvoscanescens (C;MD,PJ)
Cryptantha gracilis Osterh. (U;PJ)
Cryptantha humilis (Gray) Payson var. nana (Eastw.) (Higgins (O;PJ)
Cryptantha jamesii (Torr.) Payson var. disticha (Eastw.) Payson (U;MD,WR)
Cryptantha jamesii (Torr.) Payson var. setosa (Jones) Johnst. (C;PJ)
Cryptantha johnstonii Higgins (U;SID)
Cryptantha jonesiana (Payson) Payson (U;SID)
Cryptantha mensana (Jones) Payson (O;SID)
Cryptantha paradoxoza (Nels.) Payson (O;PJ)
Cryptantha recurvata Coville (O;MD,PJ,WR)
Cryptantha rolfillii Johnst. (O;MD,PJ,WR)
Cryptantha tenuis (Eastw.) Payson (O;WR)
Cryptantha wetherillii (Eastw.) Payson (O;WR)
Heliotropium convolvulaceum (Nutt.) Gray (U;SnD)
Lappula occidentalis (Wats.) Greene var. cupulata (Gray) Higgins (R;MD,PJ)
Lappula occidentalis (Wats.) Greene var. occidentalis (C;W)
Lithospermum incisum Lehm. (C;PJ)
Tiquila latior (Johnst.) Richardson (O;SID,MD)

BRASSICACEAE
Arabis demissa Greene var. lanugida Rollins (R;PJ,PM)
Arabis perennans Wats. (O;PJ)
Arabis pulchra Jones var. pallens Jones (O;PJ)
Arabis selbyi Rydb. (C;PJ)
Caulanthus crassicaulis (Torr.) Wats. (C;PJ)

Chorispora tenella (Pall.) DC. (U;DS)
Descurainia pinnata (Walt.) Britt. var. filipes (Gray)
Peck
Descurainia pinnata (Walt.) Britt. var. intermedia (Rydb.) Hitchc. (U;MD)
Descurainia pinnata (Walt.) Britt. var. osmariun (Cockerell) Shinners (C;W)
Descurainia sophia (L.) Webb. (O;WR)
Dithyreum wilsizenii Engelm. in Wisliz. (O;SnD)
Lepidium densiflorum Schrad. var. puberculatum (Nels.) Thell. (R;PJ)
Lepidium densiflorum Schrad. var. ramosum (Nels.) Thell. (R;MD,PJ)
Lepidium montanum Nutt. var. jonesii (Ryd.) Hitchc. (C;W)

Lesquerella alpina (Nutt.) Wats. var. alpina (O;PJ,PM)
Lesquerella intermedia (Wats.) Heller (O;PJ,PM)
Lesquerella kingii Wats. (R;PJ)
Lesquerella rectipes Woot. & Standl. (C;W)
Lesquerella subumbellata Rollins (U;PJ,PM)
Malcolmia africana (L.) R. Br. in Ait. (C;SID,DS)
Physaria acutifolia Rydb. (C;PJ)
Physaria chambersii Rollins (U;PJ)
Schoencrambe linifolia (Nutt.) Greene (O;PJ,PM)
Sisymbrium altissimum (L.) (C;PJ,PM)
Stanleya pinnata (Pursh) Britt. (C;SID)
Stanleya viridiflora Nutt. in T. & G. (U;MD,PJ)
Streptanthella longirostris (Wats.) Rydb. (C;W)
Streptanthus cordatus Nutt. ex T. & G. (C;PJ)
Thelepodiospermum barnebyi Welsh & Atwood (R;MD)
Thelepodiospermum divaricata (Rollins) Welsh & Reveal (C;SID,MD,PJ)

CACTACEAE
Coryphantha vicipara (Nutt.) Britt. & Rose (O;PJ)
Echinocereus triglochidiatus Engelm. var. melanacanthus (Engelm.) Benson (C;SID,MD,PJ)
Opuntia basilaris Engelm. & Bigel. (O;SnD,MD,PJ)
Opuntia erinacea Engelm. (O;SnD)
Opuntia polyacantha Haw. (C;W)
Pediocactus despainii Welsh & Goodrich (R;PJ)
Pediocactus simpsonii (Engelm.) Britt. & Rose (R;PJ)
Sclerocactus parviflorus Clover & Jitter var. intermedius (Peebles) Woodruff & Benson (C;W)
Sclerocactus wrightiae Benson (U;SID,MD,PJ)

CAPRARIDACEAE
Cleome lutea Hook. (C;SID)
Cleome serrulata Pursh (O;PJ)
Cleome palmerana Jones (O;PJ)

CAPRIFOLIACEAE
Sambucus coerulea Raf. (U;PJ,PM)
Symphoricarpus longiflorus Gray (O;PJ,PM)

CARYOPHYLLACEAE
Arenaria eastwoodiae Rydb. (C;PJ)
Arenaria fendleri Gray (C;SID)
Arenaria hookeri Nutt. var. desertorum Maguire (R;PJ)
Paronychia sessiliflora Nutt. (O;PJ,WR)

CELASTRACEAE
Forseliesia meionandra (Koehne) Heller (O;PJ,RO)

CHENOPODIACEAE
Allenrolfea occidentalis (Wats.) Kuntze (O;SID)
Atriplex argentea Nutt. (U;SID)
Atriplex canescens (Pursh) Nutt. (C;SID,MD)
Atriplex confertifolia (Torr. & Frem.) Wats. (C;SID)
Atriplex corrugata Wats. (C;SID)
Atriplex cuneata Nels. (C;SID)
Atriplex graciliflora Jones (U;SID)
Atriplex powelli Wats. (C;SID)
Atriplex saccaria Wats. (C;MD)
Bassia hyssopifolia Pallas (U;WR)
Ceratoideae lanata (Pursh) Howell (C;SID)
Chenopodium fremontii Wats. (C;W)
Chenopodium glaucum L. (O;SID)
Chenopodium pratericola Rydb. (C;SS)
Halcyon glomeratus (Bieb.) Meyer (C;DS)
Kochia iranica Bornm. (C;WR)
Kochia americana Wats. (R;SID,WR)
Monolepis nutalliana (Schult.) Greene (O;WR)
Salola iberica Sennen & Pau (C;W)
Sarcobatus vermiculatus (Hook.) Torr. (C;SID,SS,WR)
Suada torreyana Wats. (C;SS,WR)

**CONVOLVULACEAE**
Convulus arvensis L. (C;WR)
Cuscuta echioides Engelm. (C;MD)

**CUPRESSACEAE**
Juniperus osteosperma (Torr.) Little (C;P,PM)
Juniperus scopulorum Sarg. (U;PM)

**CYPRESSACEAE**
Carex filiformis Nutt. (C;SS)
Carex parrjana Dewey (R;SS)
Eleocaris palustris (L.) Boomer & Schult. (O;SS)
Eleocaris rostellata (Torr.) Torr. (U;SS)
Scirpus maritimus L. (O;SS)
Scirpus pungens Vahl. (C;SS)
Scirpus validus Vahl. (O;SS)

**ELAEAGNACEAE**
Shepherdia rotundifolia Parry (U;PM)
Shepherdia argentea (Pursh) Nutt. (U;WR)

**EPIDERIDACEAE**
Ephedra torreyana Wats. (C;W)
Ephedra viridis Coville (C;W)

**EQUISETACEAE**
Equisetum laevigatum A. Br. (C;SS)

**EUPHORBIACEAE**
Euphorbia albomarginata T. & G. (U;P)
Euphorbia fendleri T. & G. (C;SID,MD,PD)
Euphorbia micromera Boiss.
Euphorbia nepradenia Barneby (R;SID,WR)
Euphorbia palmeri Engelm. (R;SID)
Euphorbia parryi Engelm. (C;SD)
Euphorbia robusta (Engelm.) Small (O;P,PM)
Euphorbia serpyllifolia Pers. (C;P,PM)

**FABACEAE**
Astragalus amphioxys Gray var. amphioxys (C;SID,MD,PD)
Astragalus amphioxys Gray var. vespertinus (Sheld.)
Jones (C;W)
Astragalus argophyllus Nutt. var. martini Jones (U;P,PM)
Astragalus asclepiadoides Jones (C;SID)
Astragalus brandgeei Porter (U;SID,MD,PD)
Astragalus calycosus Torr. (O;SID,MD,PD)
Astragalus chilensis Sheldon (U;WR)
Astragalus coltonii Jones var. coltonii (C;SID,MD,PD)
Astragalus convallarius Greene var. convallarius
(U;P,PM)
Astragalus cymoides Jones (C;SID,MD,PD)
Astragalus desperatus Jones var. desperatus
(C;SD,MD,PD)
Astragalus desperatus Jones var. petrophilus Jones (C;MD,SnD,PD)
Astragalus episcopalus Wats. (C;SID,MD)
Astragalus flavus Nutt. var. argillosus (Jones) Barneby (C;SID)
Astragalus flavus Nutt. var. flavus (C;SID,MD,PD)
Astragalus flexuosus (Hook.) Don. var. diehlii (Jones)
Barneby (O;SID,MD,PD)
Astragalus geyeri Gray (O;MD)
Astragalus kentrophyta Gray var. coloradoensis Jones (U;WR,RO)
Astragalus kentrophyta Gray var. elatus Wats. (R;SID)
Astragalus lentiginosus Doug. var. araneosus (Sheld.)
Barneby (C;MD,PD)
Astragalus lentiginosus Doug. var. palans Jones (C;SID,PD)
Astragalus lanclonensis Jones (C;SID,MD,PD)
Astragalus lanclonensis Jones (C;SID,MD,PD)
Astragalus mangelanus Gray (O;P,PM)
Astragalus spatulatus Sheld. (O;P,PM)
Astragalus subcinereus Gray var. basalticus Welsh (R;P)
Astragalus tenellus Pursh (O;MD,PD)
Astragalus wingatus Wats. (R;SID,MD,PD)
Astragalus woodruffii Jones (O;SnD,MD)
Dalea flavescens (Wats.) Welsh (O;SnD,MD,PD)
Dalea oshigophylla (Torr.) Shinners (O;WR,RO)
Glycyrrhiza lepidota Pursh (C;WR,SS)
Hedysarum boreale Nutt. (C;MD,PD,PM)
Hoffmannseggia repens (Eastw.) Cockerell (C;SnD)
Lathyrus brachychalyx Rydb. var. eusocinus (Butters & St. John) Welsh (U;WR)
Lupinus argenteus Pursh var. argenteus (R;WR)
Lupinus argenteus Pursh var. tenellus Doug. (U;MD)
Lupinus brevicaulis Wats. (U;SID,MD)
Lupinus pusillus Pursh var. pusillus (C;SID,MD,PD)
Lupinus pusillus Pursh var. rubens (Rydb.) Welsh
Medicago sativa L. (C;WR)
Melilotus albus Medicus (O;SS,WR)
Melilotus officinalis (L.) Lam. (O;SS,WR)
Oxytropis lambertii Pursh var. bigelovianus Gray
(R;P,PM)
Oxytropis sericea Nutt. (O;MD,PD)
Pseoralea lanceolata Pursh var. lanceolata (U;MD,PD)
Pseoralea lanceolata Pursh var. stenophylla (Rydb.)
Toft & Welsh (O;WR)
Pseoranthus polyadenius (Torr.) Rydb. var. jonesii
Barneby (R;SID,MD)
Pseoranthus thompsoniae (Vail) Welsh & Atwood
(R;MD)
Robinia pseudoacacia L. (R;WR)
Sophora stenophylla Gray (O;MD)

**FUMARIACEAE**
Corydalis aurea Willd. (R;P)
GENTIANACEAE
Swertia albolamarginata (Wats.) Kunz (R;PM)
Swertia utahensis (Jones) St. John (C;SnD,MD)

HYDROPHYLLACEAE
Phacelia concolor Atwood (R;SbD)
Phacelia corrugata Nels. (C;W)
Phacelia demissa Gray var. demissa (O;SbD,PM)
Phacelia demissa Gray var. heterotricha Howell
Phacelia indecora Howell (R;SbD)
Phacelia icesiana Torr. (C;SbD,MD,PM)
Phacelia rafaelensis Atwood (C;MD,PM)

JUNCACEAE
Juncus arcticus Willd. (C;SbD)
Juncus balticus Willd. (C;SbD)
Juncus nodosus L. (O;SbD)
Juncus torreyi Coville (O;SbD)

JUNCAGINACEAE
Triglochin maritima L. (U;SbD)

LILIACEAE
Allium geyeri Wats. (C;PM)
Allium macrotratum Rydb. (U;SbD)
Allium textile Nels. & Macbr. (C;SbD)
Androstephium breviflorum Wats. (C;SbD,MD,PM)
Asparagus officinalis L. (O;WR,SS)
Calochortus nuttallii T. & G. (C;SbD,MD)
Eremocrinum albumarginatum (Jones) Jones (C;SbD)
Smilacina stellata (L.) Desf. (C;HG)
Yucca harrimaniae Trel. (C;SbD,MD,PM)

LINACEAE
Linum aristatum Engel (U;WR)
Linum perenne L. (C;WR)
Linum puberulum (Engelm.) Heller (O;SbD)
Linum subteres Winkler (O;WR,PM)

LOASACEAE
Mentzelia albicaulis Doug. (C;SbD,MD,PM)
Mentzelia humilis (Gray) Darl. (U;WR)
Mentzelia multiflora (Nutt.) Gray (C;SbD)
Mentzelia pterosperma Eastw. (U;WR)
Mentzelia pumila (Nutt.) T. & G. (O;WR)

MALVACEAE
Sphaeralcea coccinea (Nutt.) Rydb. (C;W)
Sphaeralcea grossularifolia (Hook. & Arn.) Rydb. (O;SbD,MD)
Sphaeralcea leptophylla (Gray) Rydb. (R;WR)
Sphaeralcea munroana (Doug.) Spach
Sphaeralcea parviflora Nels. (C;W)
Sphaeralcea psoraleoides Welsh (R;SbD,MD)

NYCTAGINACEAE
Abronia elliptica Nels. (C;SbD,MD,WR)
Abronia nana Wats. (U;SbD,PM)
Allionia incarnata L.
Oxybaphus linearis (Pursh) Robins. (C;W)
Tripterosalyx micranthus (Torr.) Hook. (O;SbD)

OLEACEAE
Frazinus anomala Torr. in Wats. (C;WR)

ONAGRACEAE
Calypolus lavandulaefolius (T. & G.) Raven (O;PM,RO)
Calystegia clematitis (Munz) Raven (C;SbD,MD)
Calystegia scapoida (T. & G.) Raven (C;SbD,MD)
Calystegia walkeri (Nels) (R;SbD,MD)
Oenothera brachycarpa (Gray) Britt. (U;MD,PM,WR)
Oenothera caespitosa Nutt. (C;SbD,MD,WR)
Oenothera pallida Lindl. ssp. pallida (C;SbD,MD,WR)

Oenothera pallida Lindl. ssp. trichocalyx (Nutt.) Muiz & Klein (C;SbD,MD)

ORCHIDACEAE
Epipactis gigantea Doug. ex Hook. (C;HG,SS)

Orobanchaceae
Orobanche fasciculata Nutt. (O;W)

PAPAVERACEAE
Argemone corymbosa Greene (C;SbD)
Argemone munita Dur. & Hillg. (C;SbD)

PINACEAE
Pinus edulis Engelm. (C;PM)
Pinus ponderosa Lawson (C;PM)

PSEUDOTASGA MENZIESII (Mirb.) Franc. (C;PM)

PLANTAGINACEAE
Plantago patagonica Jacq. (C;SbD,MD)

POACEAE
Agropyron caninum (L.) Beauv. (U;MD,RO)
Agropyron cristatum (L.) Gaertn. (C;SbD,PM)
Agropyron spicatum (Pursh) Scribn. & Smith (U;PM)
Agropyron trachycaulum (Link) Malte (U;WR)
Andropogon halii Hackel (R;WR)
Aristida purpurea Nutt. (C;W)
Bouteloua curtipendula (Michx.) Gray (R;MD)
Bouteloua gracilis (H.B.K.) Lag. ex Steud. (C;SbD,MD,PM)

Bromus japonicus Thunb. (R;PM)
Bromus tectorum L. (C;WR,DS)
Calamagrostis scopulorum Jones (U;WR)
Dichanthelium lanuginosum (Elliott) Gould (U;SbD)

DISTICHIS SPICATA (L.) Greene var. stricta (Torr.) Scribn. (C;SbD,WR)

Elymus canadensis L. (U;WR)
Elymus cinereus Scribn. & Merr. (O;MD,PM)
Elymus junceus Fischer (R;SbD,MD)
Elymus salina Jones (C;PM)

Erioneuron pilosum (Buckley) Nash (C;SbD,MD,RO,WR)
Erioneuron pulehllum (H.B.K.) Tateoka (R;PM)
Festuca pratensis Huds. (U;SbD)
Hilaria jamesii (Torr.) Benth. (C;W)
Hordeum jubatum L. (C;WR)
Muhlenbergia asperfolia (Nees & Mey.) Parodi (O;PM)

Muhlenbergia pungens Thurb. (C;SbD)
Munroa squarrosa (Nutt.) Torr. (O;PM)

Oryzopsis hymenoides (Roem. & Schult.) Ricker (C;W)

Oryzopsis microstachys (Trin. & Bupr.) Thurb (U;PM)
Panicum virgatum L. (O;SbD,WR)

Phragmites australis (Car.) Trin. ex Steud. (C;SbD)

Poa fendleriana (Steud.) Vasey (O;PM)

Poa pratensis L. (U;SbD,WR)

Poa sandbergii Vasey (U;PM)

Polypogon monspeliensis (L.) Desf. (U;Ss,WR)

Schedonorus paniculatus (Nutt.) Trel. (R;SbD)

Schizachyrium scoparium (Michx.) Nash (O;PM,WR)

Sitanion lyrix (Nutt.) Smith (C;W)

Spartina gracilis Trin. (U;SbD)

Sporobolus airoides (Torr.) Trin. (C;SbD,MD)

Sporobolus contractus Hitchc. (O;MD,PM,WR)

Sporobolus cryptandrus (Torr.) Gray (C;SbD,MD,PM)

Sporobolus flexuosus (Thurb.) Rydb. (U;SbD,MD)

Sporobolus giganteus Nash

Stipa arida Jones (U;WR)

Stipa comata Trin. & Bupr. (C;PM,PM)

Stipa colombiana Macoun. (U;PM)
Stipa speciosa Trin. & Rupr. (U;PJ)
Vulpia octoflora (Walt.) Rydb. (O;PJ,WR)

POLIOCOCCACEAE
Gilia aggregata (Porsh) Spreng. (C;W)
Gilia congesta Hook. (O;SID)
Gilia grannisonii T. & G. (C;MD,WR)
Gilia inconspicua (Smith) Sweet (C;PJ)
Gilia latifolia Wats. (R;RO,WR)
Gilia leptomera Gray (C;SnD,MD,PJ)
Gilia polycladon Torr. in Eaton (O;SID)
Gilia punilla Nutt. (O;SID)
Gilia roseata Rydb. (C;WR,RO)
Gilia stenothyrus Gray (O;PJ)

POLYGONACEAE
Eriogonum latum Torr. in Sitgr. (C;PJ)
Eriogonum batemani Jones (C;PJ)
Eriogonum bicolor Jones (C;MD,PJ)
Eriogonum cernuum Nutt. (C;SID)
Eriogonum corymbosum Benth. var. corymbosum
(C;SID,MD)
Eriogonum fasciculatum Benth. var. polifolium
(Benth. in DC.) T. & G. (R;MD)
Eriogonum flexum Jones (R;SID)
Eriogonum gordonii Benth. (U;SID,MD)
Eriogonum hookeri Wats. (O;MD,PJ)
Eriogonum inflatum Torr. & Frem. var. fusiforme
(Small) Reveal (O;SID,MD,PJ)
Eriogonum inflatum Torr. & Frem. var. inflatum
(C;SID,MD)
Eriogonum jamesii Benth. var. flavescens Wats.
(C;MD,PJ,WR)
Eriogonum lepto cladon T. & G. var. lepto cladon
(C;SID)
Eriogonum microthecum Nutt. var. foliosum (T. & G.)
Reveal (O;SID)
Eriogonum ovalifolium Nutt. var. ovalifolium
(C;W,RO)
Eriogonum salsuginosum (Nutt.) Hook. (O;MD,PJ)
Eriogonum shockleyi Wats. var. longilobum (Jones)
Reveal (C;SID,MD)
Eriogonum smithii Reveal
Eriogonum tumulosum (Barneby) Reveal (U;PJ)
Eriogonum wetherillii Eastw. (O;W)
Polygonum aviculare L. (O;WR,DS)

POLYPODIACEAE
Adiantum capillus-veneris L. (U;HG)
Cheilanthes fei Moore (O;HG)
Pellaea glabella Mett. ex Kuhn (R;HG)

PORTULACEAE
Portulaca oleracea L. (R;PJ,PM)
Talinum calidum Greene (O;PJ)

RANUNCULACEAE
Aquilegia micrantha Eastw. (C;HG)
Clematis ligusticifolia Nutt. (C;WR)
Delphinium nuttallianum Pritz. ex Walp. (O;W)
Delphinium scaposum Greene (O;PJ)

Ranunculus cymbalaria Pursh (U;SS)
Ranunculus tectorius Crantz (O;DS)

ROSACEAE
Amelanchier utahensis Kochne (C;WR,SS)
Cercocarpus intricatus Wats. (C;PJ,RO)
Cercocarpus montanus Raf. (C;PJ,PM,WR)
Coeleogyne ramosissima Torr. (C;SnD)
Cowania mexicana D. Don (C;PJ)
Fallopia paradoxoa (D. Don) Endl. (O;WR)
Physocarpus alternans (Jones) Howell
Physocarpus monogynus (Torr.) Cou. (U;PJ)
Puashia tridentata (Porsh) DC. (O;WR)
Rosa woodsii Lindl. (R;PM)

RUBIACEAE
Galium multiflorum Kellogg (O;WR)

SALICACEAE
Populus x acuminata Rydb. (O;WR,SS)
Populus angustifolia James ex Torr. (O;WR)
Populus fremontii Wats. (C;WR,SS)
Populus tremuloides Michx. (O;PM)
Salix exigua Nutt. (C;SS)

SANTALACEAE
Comandra umbellata (L.) Nutt. var. pallida (DC.)
Jones (C;W,WR)

SAXIFRAGACEAE
Philadelphus microphyllus Gray (C;PJ,PM)
Ribes cereum Dougl. (R;PJ,PM)
Ribes leitanthum Gray (O;PM)

SCROPHULARIACEAE
Castilleja chromosa Nels. (O;W)
Castilleja linariaefolia Benth. (O;SS)
Castilleja scabra Hook. (O;W)
Cordylanthus kingii Wats. (O;PJ)
Cordylanthus reverittii Gray
Mimus rubellus Gray (R;PM)
Penstemon carnosus Pennell (C;PJ)
Penstemon cyanocaulis Payson (U;WR)
Penstemon eutonium Gray (O;PJ,PM)
Penstemon lentus Pennell (U;WR)
Penstemon utahensis Eastw. (C;PJ)

SELAGINELLACEAE
Selaginella michauxii Eaton ex Underw. (U;HG)

TAMARICACEAE
Tamarix ramosissima Laded. (C;SS,WR)

TYPHACEAE
Typha latifolia L. (C;SS)

ULMACEAE
Celtis reticulata Torr. (U;WR)
Ulmus pumila L. (R;WR)

LITERATURE CITED